CHI MEI OPTOELECTRONICS CORP.

Issued Date: May. 17, 2010
Model No.: V216B1 – LE1
Preliminary

TFT LCD Preliminary Specification

MODEL NO.: V216B1- LE1

Customer: _____

Approved by: _____

Note:

Approved By	TV Product Marketing & Management Div
	Chao-Chun Chung

CONTENTS

REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver. 1.0	Feb. 23, '10	All	All	The Preliminary Specification was first issued.
Ver. 1.1	May.17, '10	4	1.2	Modified brightness from 400nits to 300nits.
		30	11	Enhanced the drawings' resolution.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

The V216B1-LE1 model is a 21.6 inch TFT Liquid Crystal Display module with LED Backlight and a 30-pin 1ch-LVDS interface. This module supports 1366 x 768 (16:9 wide screen) mode and displays up to 16.7 (6-bit+Hi-FRC colors) millions colors. The inverter module for backlight is not built-in.

1.2 FEATURES

- Excellent Brightness: 300nits
- Contrast Ratio: 1000:1
- Fast Response Time: 5ms
- Color Saturation: NTSC 68%
- WXGA (1366 x 768 pixels) Resolution
- DE (Data Enable) Only Mode
- LVDS (Low Voltage Differential Signaling) Interface
- Viewing Angle: 170(H)/160(V) (CR>10) TN Technology
- Color Reproduction (Nature Color)

1.3 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Active Area	477.417 (H) x 268.416 (V) (21.6" diagonal)	mm	-
Bezel Opening Area	481.5 (H) x 272.5 (V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1366 x R.G.B. x 768	pixel	-
Pixel Pitch (Sub Pixel)	0.1165 (H) x 0.3495 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16.7 millions	color	-
Display Operation Mode	Transmissive mode / Normally White	-	-
Surface Treatment	Hard coating (3H), AG (Haze 25%)	-	-

1.4 MECHANICAL SPECIFICATION

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	500.5	501	501.5	mm	-
	Vertical(V)	296.5	297	297.5	mm	-
	Depth(D)	13.1	13.6	14.1	mm	To PCB cover
Weight		-	2100	2150	g	-

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	TST	-20	+60	℃	(1)
Operating Ambient Temperature	TOP	0	+50	℃	(1), (2)
Shock (Non-Operating)	SNOP	-	50	G	(3), (5)
Vibration (Non-Operating)	VNOP	-	1.0	G	(4), (5)

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90% RH Max. (Ta ≦ 40 ℃).

(b) Wet-bulb temperature should be 39 ℃ Max. (Ta > 40 ℃).

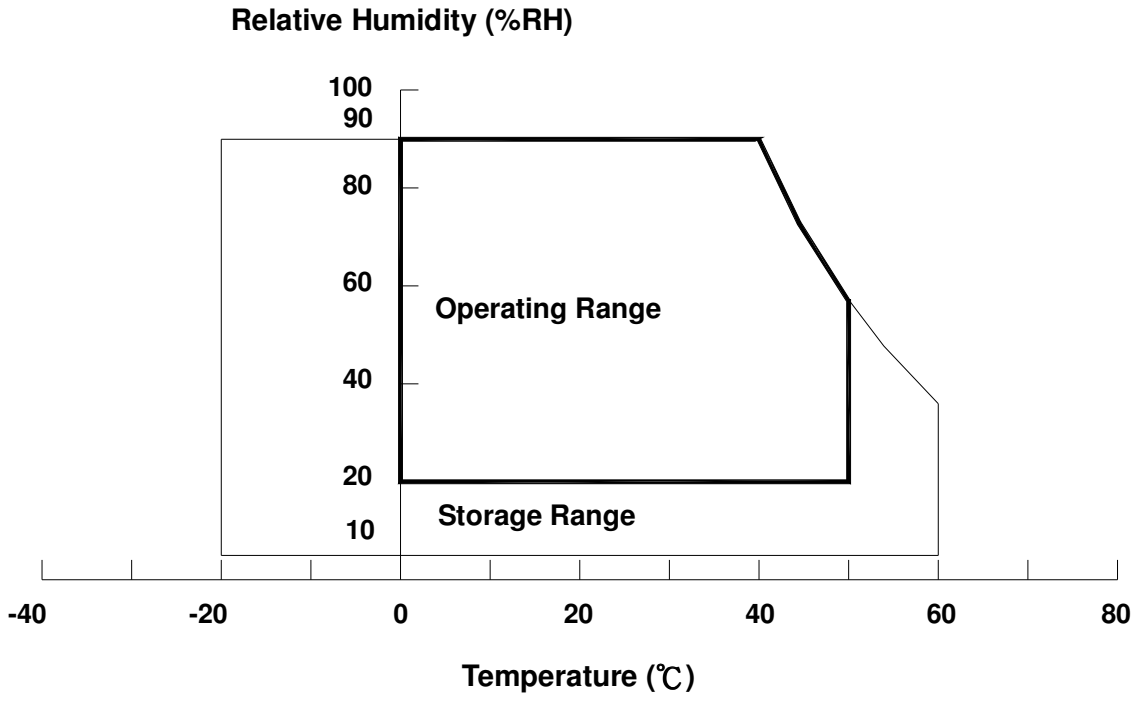
(c) No condensation.

Note (2) The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 65 ℃ with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 65 ℃. The range of operating temperature may degrade in case of improper thermal management in final product design.

Note (3) 11 ms, half-sine wave, 1 time for ± X, ± Y, ± Z.

Note (4) 10 ~ 200 Hz, 10 min, 1 time each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.



2.2 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	Vcc	-0.3	6.0	V	(1)
Input Signal Voltage	V_{IN}	-0.3	3.6	V	

2.3 BACKLIGHT UNIT

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Forward Current Per Input Pin	I_F	0	40	60	mA	(1), (2) Duty=100%
LED Reverse Voltage Per Input Pin	V_R	-	-	70	V	
LED Pulse Forward Current Per Input Pin	I_{FP}	-	-	160	mA	Pulse Width≦10msec. and Duty≦10%

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for input pin of LED light bar at Ta=25±2 ℃ (Refer to 3.2 for further information).

3. ELECTRICAL CHARACTERISTICS

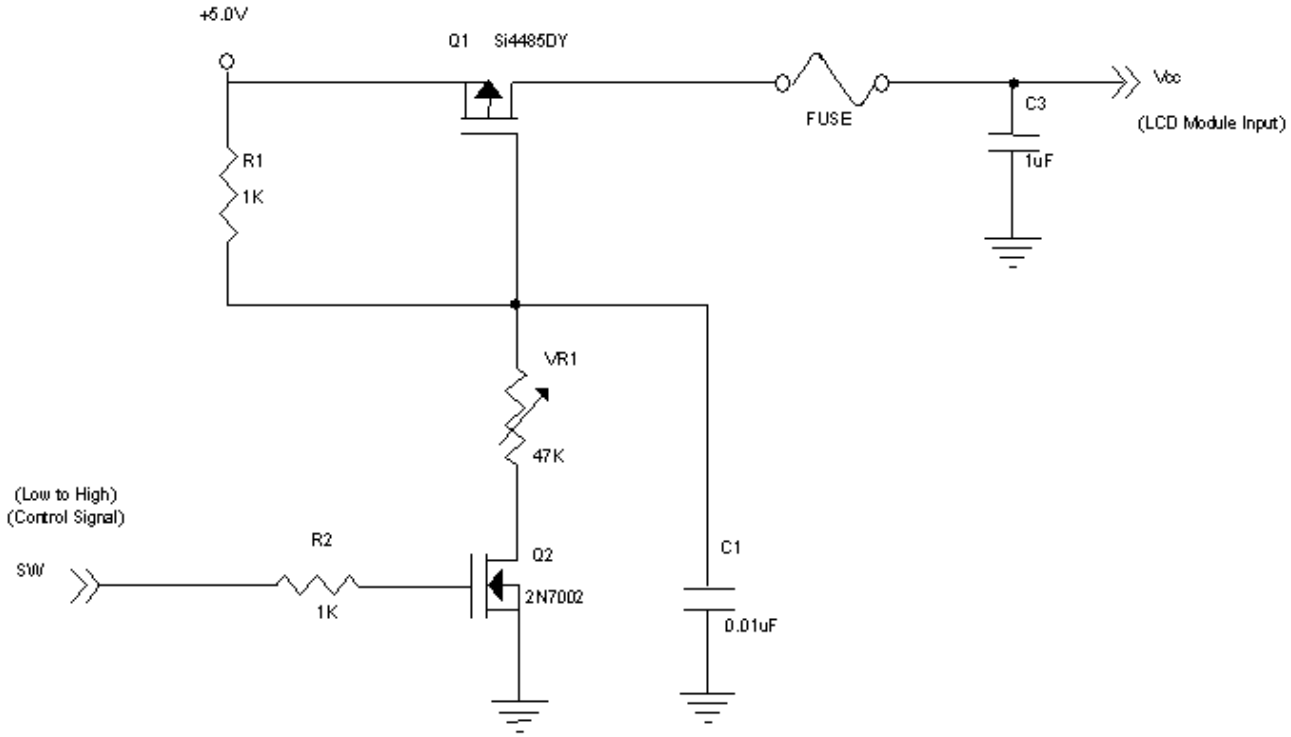
3.1 TFT LCD MODULE

Ta = 25 ± 2 ℃

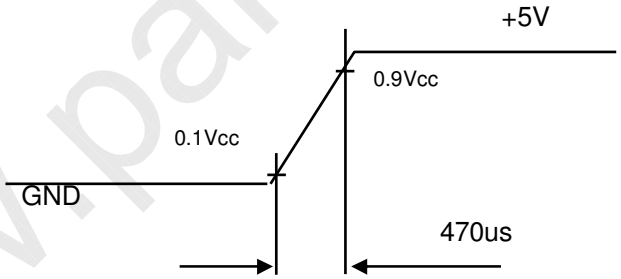
Parameter			Symbol	Value			Unit	Note
				Min.	Typ.	Max.		
Power Supply Voltage			V_{CC}	4.5	5.0	5.5	V	(1)
Rush Current			I_{RUSH}	-	-	3.0	A	(2)
Power Supply Current		White	I_{CC}	-	0.40	-	A	(3)
		Black		-	0.53	0.61	A	
		Vertical Stripe		-	0.50	-	A	
LVDS Interface	Differential Input High Threshold Voltage		V_{LVTH}	+100	-	-	mV	(4)
	Differential Input Low Threshold Voltage		V_{LVTL}	-	-	-100	mV	
	Common Input Voltage		V_{LVC}	1.0	1.2	1.4	V	
	Differential input voltage		$\|V_{ID}\|$	200	-	600	mV	
	Terminating Resistor		R_T	-	100	-	ohm	
CMOS interface	Input High Threshold Voltage		V_{IH}	2.7	-	3.3	V	-
	Input Low Threshold Voltage		V_{IL}	0	-	0.7	V	-

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:



Vcc rising time is 470us



Note (3) The specified power supply current is under the conditions at Vcc = 5 V, Ta = 25 ± 2 ℃, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

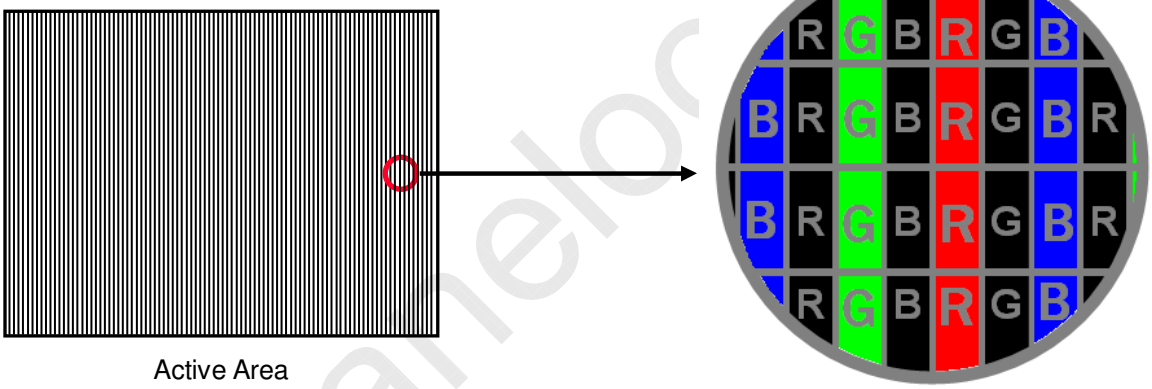
a. White Pattern

Active Area

b. Black Pattern

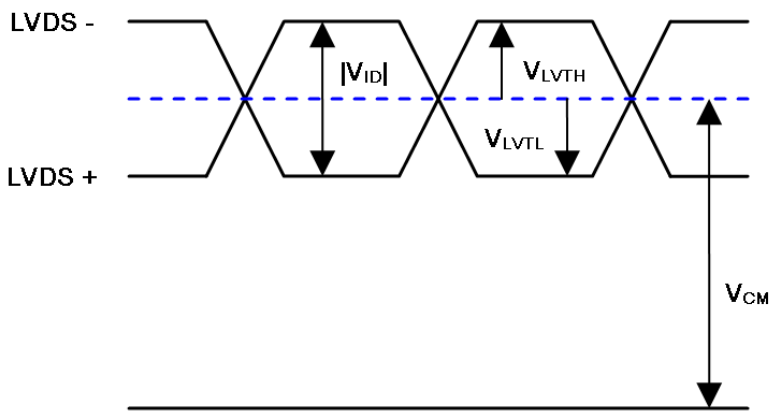
Active Area

c. Vertical Stripe Pattern



Active Area

Note (4) The LVDS input characteristics are as follows:



3.2 BACKLIGHT UNIT

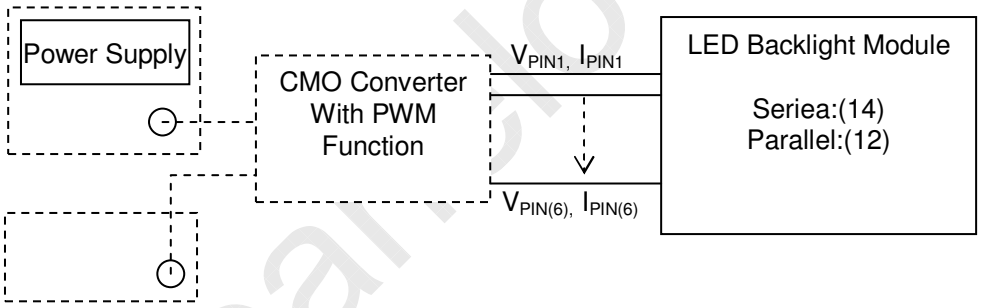
Ta = 25 ± 2 ℃

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Light Bar Input Voltage Per Input Pin	V_{PIN}	39.2	43.4	47.6	V	(1), Duty=100%, I_{PIN}=40mA
LED Light Bar Current Per Input Pin	I_{PIN}	0	40	60	mA	(1), (2) Duty=100%
LED Life Time	L_{LED}	30000	-	-	Hrs	(3)
Power Consumption	P_{BL}	-	10.416	11,424	W	(1) Duty=100%, I_{PIN}=40mA

Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:

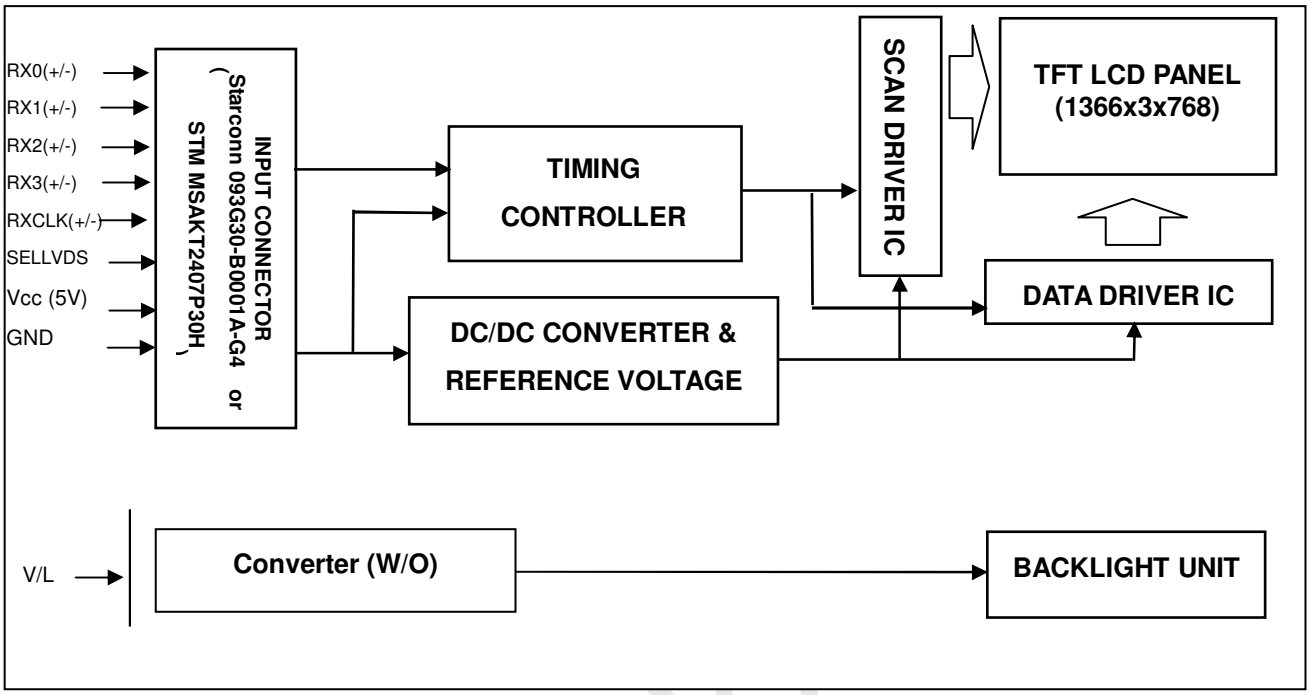
Note (2) $P_{BL} = I_{PIN} \times V_{PIN} \times$ (6) input pins

Note (3) The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at Ta = 25 ±2 ℃ and I= (20)mA (per chip) until the brightness becomes ≦ 50% of its original value.



4. BLOCK DIAGRAM OF INTERFACE

4.1 TFT LCD MODULE



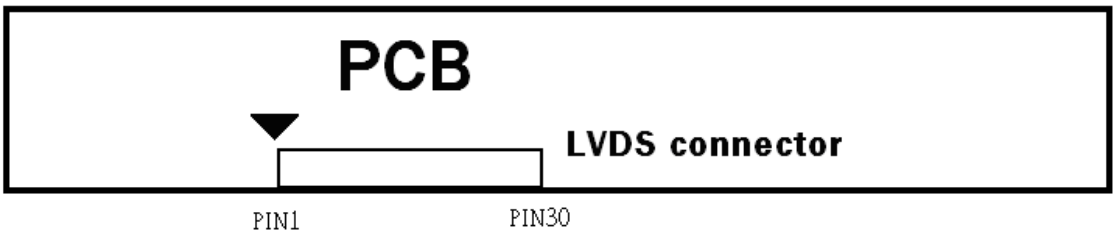
5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE INPUT

Pin No.	Symbol	Description	Note
1	NC	No connection	(2)
2	NC	No connection	(2)
3	NC	No connection	(2)
4	GND	Ground	-
5	RX0-	Negative transmission data of pixel 0	-
6	RX0+	Positive transmission data of pixel 0	-
7	GND	Ground	-
8	RX1-	Negative transmission data of pixel 1	-
9	RX1+	Positive transmission data of pixel 1	-
10	GND	Ground	-
11	RX2-	Negative transmission data of pixel 2	-
12	RX2+	Positive transmission data of pixel 2	-
13	GND	Ground	-
14	RXCLK-	Negative of clock	-
15	RXCLK+	Positive of clock	-
16	GND	Ground	-
17	RX3-	Negative transmission data of pixel 3	-
18	RX3+	Positive transmission data of pixel 3	-
19	GND	Ground	-
20	NC	No connection	(2)
21	SELLVDS (Default:VESA)	Select LVDS data format	(3)
22	NC	No connection	(2)
23	GND	Ground	-
24	GND	Ground	-
25	NC	No connection	(2)
26	VCC	Power supply: +5V	-
27	VCC	Power supply: +5V	-
28	VCC	Power supply: +5V	-
29	VCC	Power supply: +5V	-
30	VCC	Power supply: +5V	-

Note (1) Connector part no.: Starconn 093G30-B0001A-G4 or STM MSAKT2407P30H

LVDS connector pin orderdefined as follows



Note (2) Reserved for CMO internal use, please leave it open

Note (3) Low = Connect to GND: JEIDA Format, High = connect to +3.3V or Open : VESA Format.

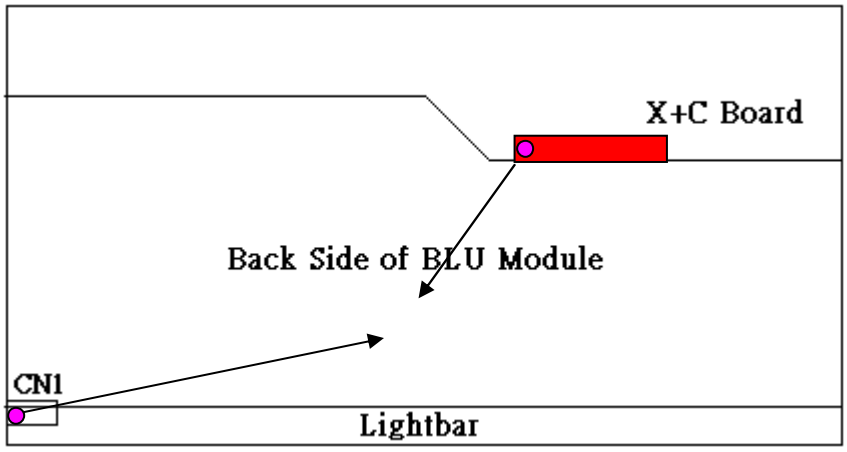
Please refer to 5.2 LVDS INTERFACE

5.2 BACKLIGHT UNIT

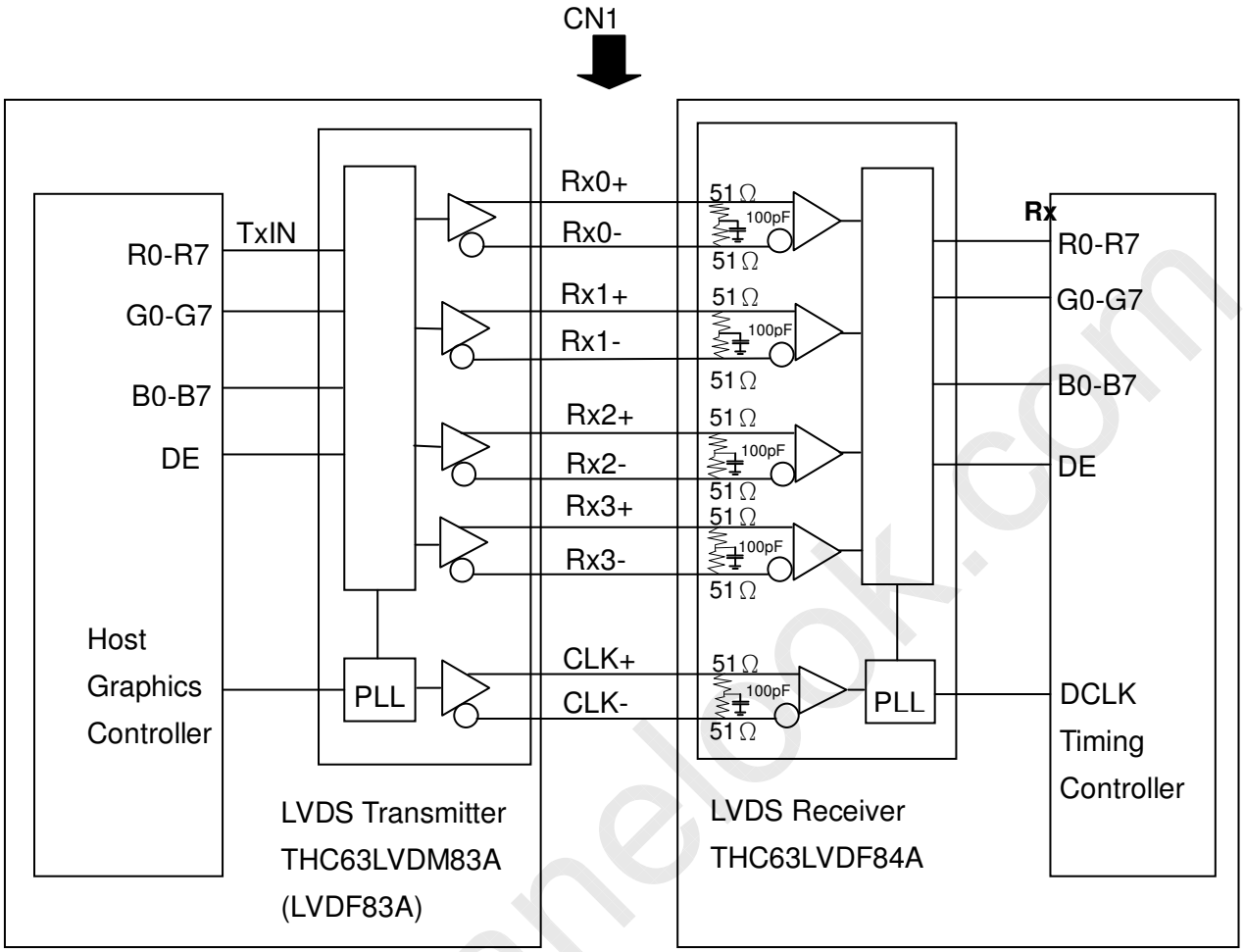
The pin configuration for the housing and the leader wire is shown in the table below.

CN1: Entery, 7083K-F12N-00L

CN1		
Pin	Symbol	Description
1	NC	No connection
2	CH1	Light-bar Feedback Channel 1
3	CH2	Light-bar Feedback Channel 2
4	CH3	Light-bar Feedback Channel 3
5	NC	No connection
6	V_L	LED Light-bar Input Power
7	V_L	LED Light-bar Input Power
8	NC	No connection
9	CH4	Light-bar Feedback Channel 4
10	CH5	Light-bar Feedback Channel 5
11	CH6	Light-bar Feedback Channel 6
12	NC	No connection



5.3 BLOCK DIAGRAM OF INTERFACE

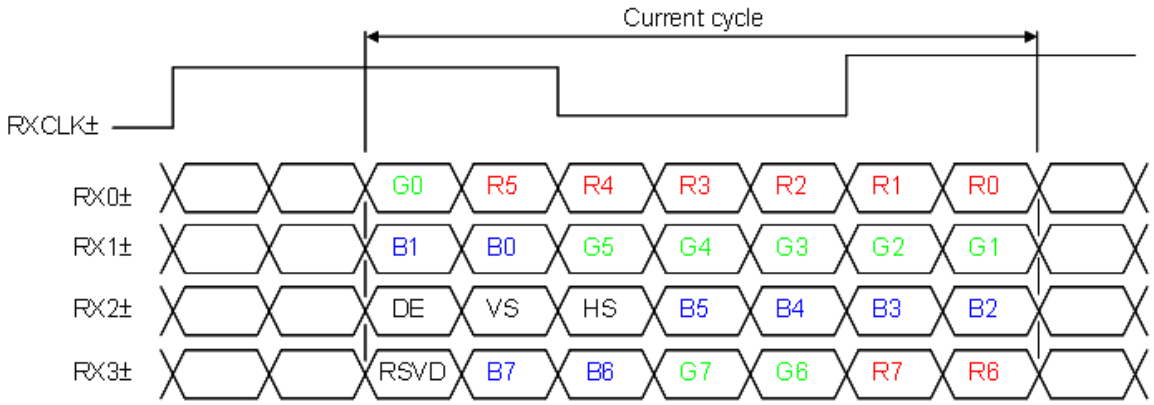


R0~R7 : Pixel R Data
G0~G7 : Pixel G Data
B0~B7 : Pixel B Data
DE : Data enable signal
DCLK : Data clock signal

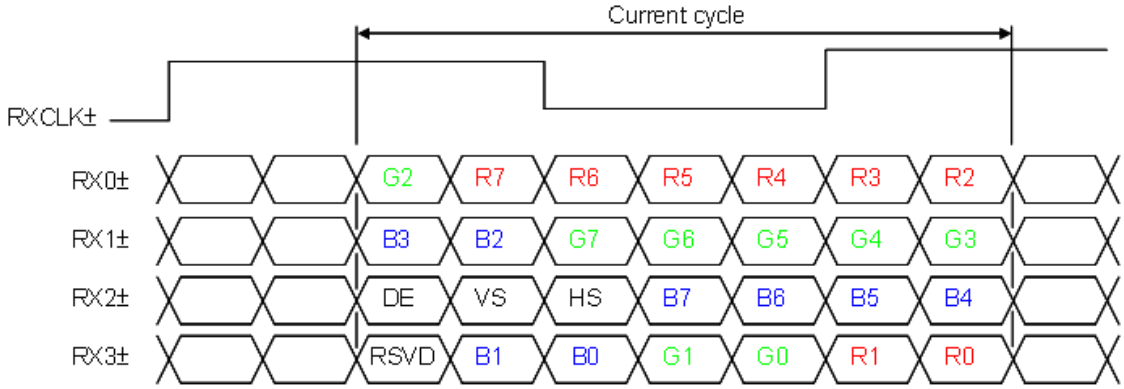
Note (1) The system must have the transmitter to drive the module.
Note (2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

5.4 LVDS INTERFACE

VESA Format: SELLVDS = H or Open



JEIDA Format: SELLVDS = L



R0~R7: Pixel R Data (7; MSB, 0; LSB)

G0~G7: Pixel G Data (7; MSB, 0; LSB)

B0~B7: Pixel B Data (7; MSB, 0; LSB)

DE: Data enable signal

Note (1) RSVD (reserved) pins on the transmitter shall be “H” or (“L” or OPEN)

5.5 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of the color versus data input.

Color		Data Signal																													
		Red										Green										Blue									
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red (0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (1)	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (2)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red (1021)	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (1022)	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green (0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Green (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
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	Green (1021)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0
	Green (1022)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Green (1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue (0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
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	Blue (1021)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1
	Blue (1022)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
	Blue (1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

(Ta = 25 ± 2 ℃)

The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock	Frequency	F_{clkin} (=1/TC)	60	76	82	MHz	-
	Input cycle to cycle jitter	T_{rcl}	-	-	200	ps	(3)
	Spread spectrum modulation range	F_{clkin_mod}	F_{clkin}-2%	-	F_{clkin}+2%	MHz	(4)
	Spread spectrum modulation frequency	F_{SSM}	-	-	200	KHz	
LVDS Receiver Data	Setup Time	Tlvsu	600	-	-	ps	(5)
	Hold Time	Tlvhd	600	-	-	ps	
Vertical Active Display Term	Frame Rate	F_{r5}	47	50	53	Hz	-
		F_{r6}	57	60	63	Hz	
	Total	Tv	778	806	1050	Th	Tv=Tvd+Tvb
	Display	Tvd	768	768	768	Th	-
	Blank	Tvb	10	38	282	Th	-
Horizontal Active Display Term	Total	Th	1442	1560	1936	Tc	Th=Thd+Thb
	Display	Thd	1366	1366	1366	Tc	-
	Blank	Thb	76	194	570	Tc	-

"Enlarging Vtotal from Max 888Th to 1050Th is OK, provided that both pixel clock & Htotal are within the specified range in the spec."

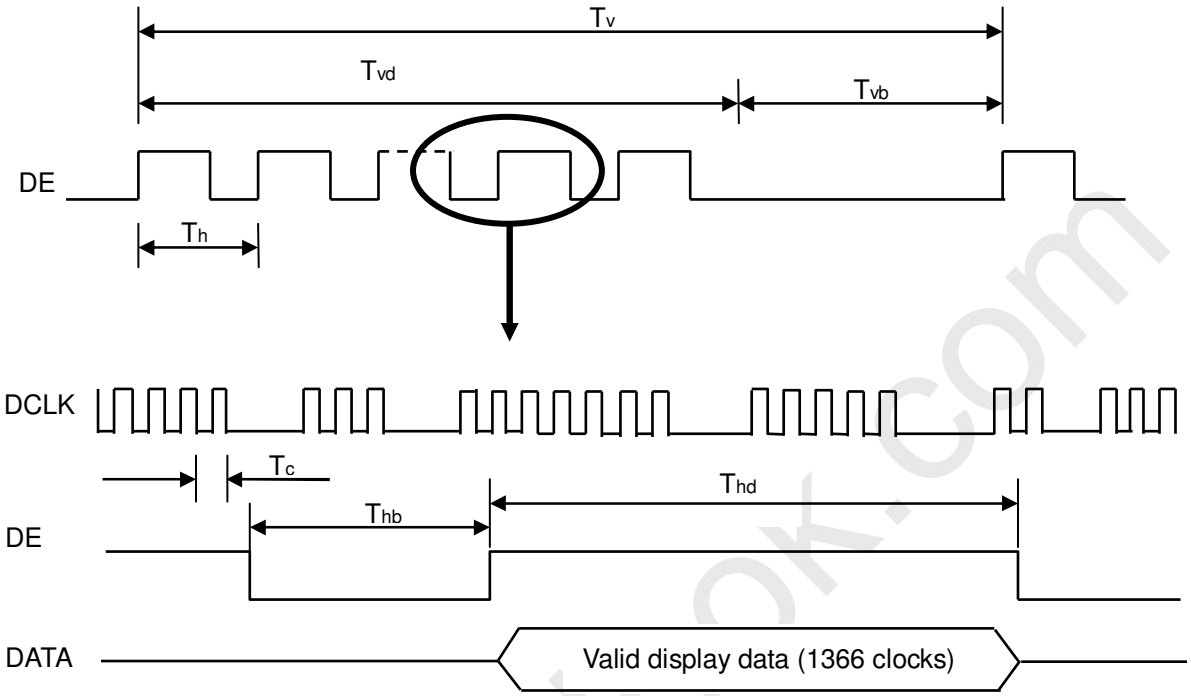
Note (1) Please make sure the range of pixel clock has follow the below equation :

Fclkin(max) ≧ Fr6 × Tv × Th

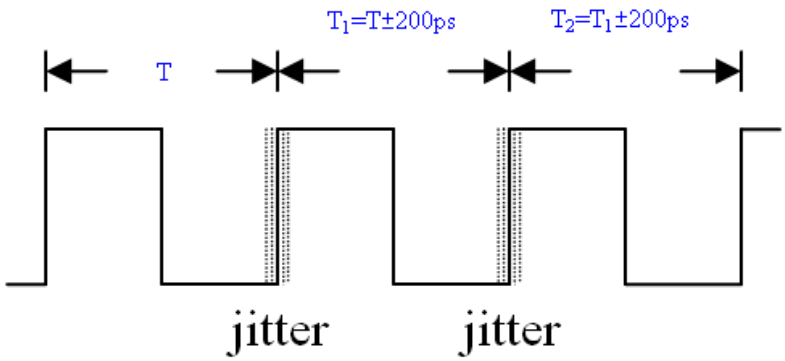
Fr5 × Tv × Th ≧ Fclkin(min)

Note (2) This module is operated in DE only mode and please follow the input signal timing diagram below :

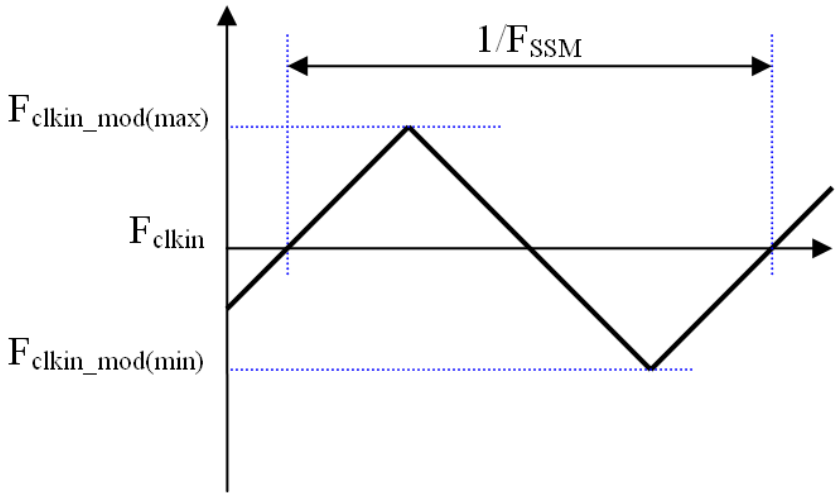
INPUT SIGNAL TIMING DIAGRAM



Note (3) The input clock cycle-to-cycle jitter is defined as below figures. Trcl = I T_1 – TI

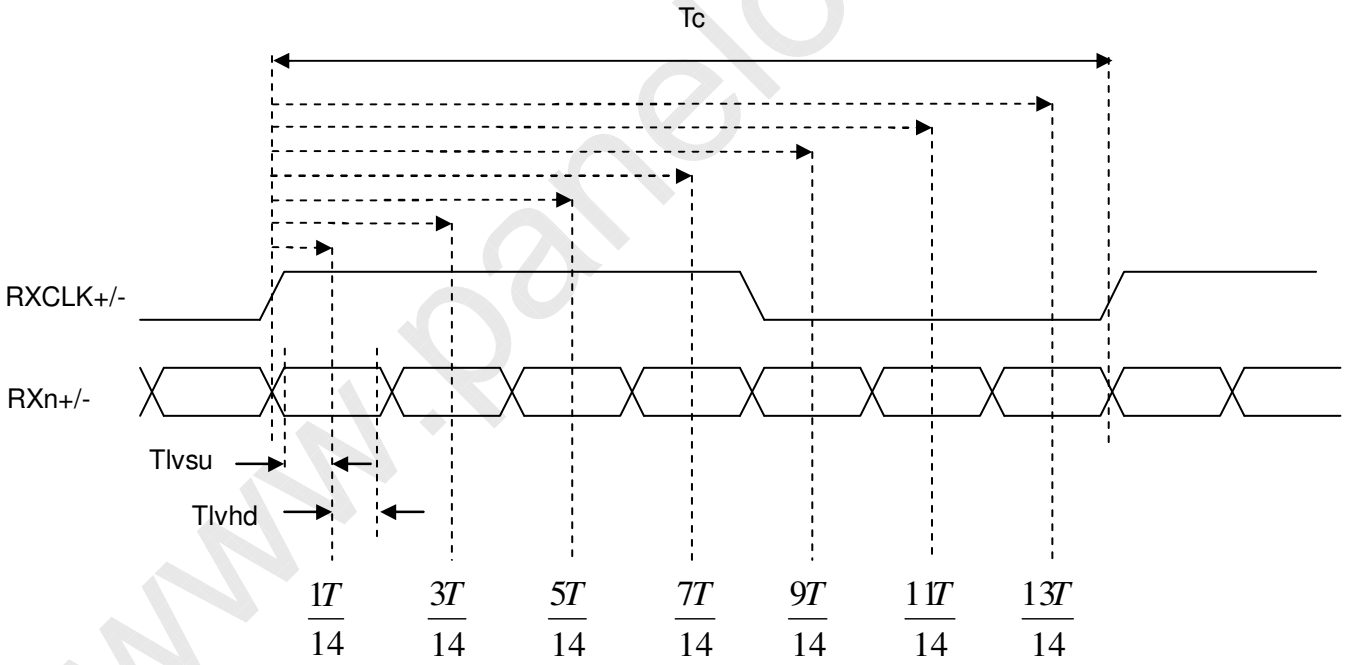


Note (4) The SSCG (Spread spectrum clock generator) is defined as below figures.



Note (5) The LVDS timing diagram and setup/hold time is defined and showing as the following figures.

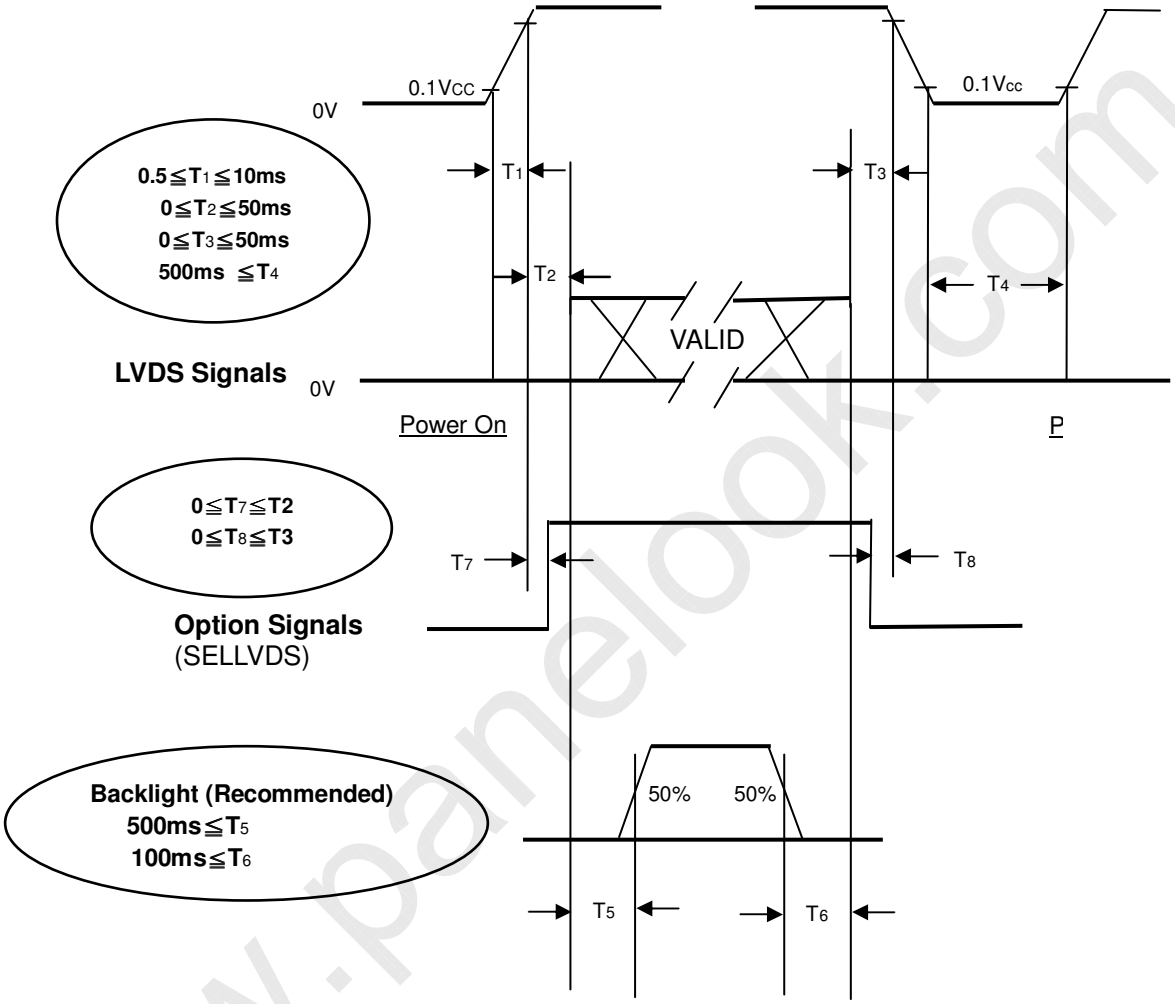
LVDS RECEIVER INTERFACE TIMING DIAGRAM



6.2 POWER ON/OFF SEQUENCE

(Ta = 25 ± 2 ℃)

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Power ON/OFF Sequence

Note (1) The supply voltage of the external system for the module input should follow the definition of Vcc.

Note (2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.

Note (3) In case of Vcc is in off level, please keep the level of input signals on the low or high impedance. If T2<0,that maybe cause electrical overstress failure.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

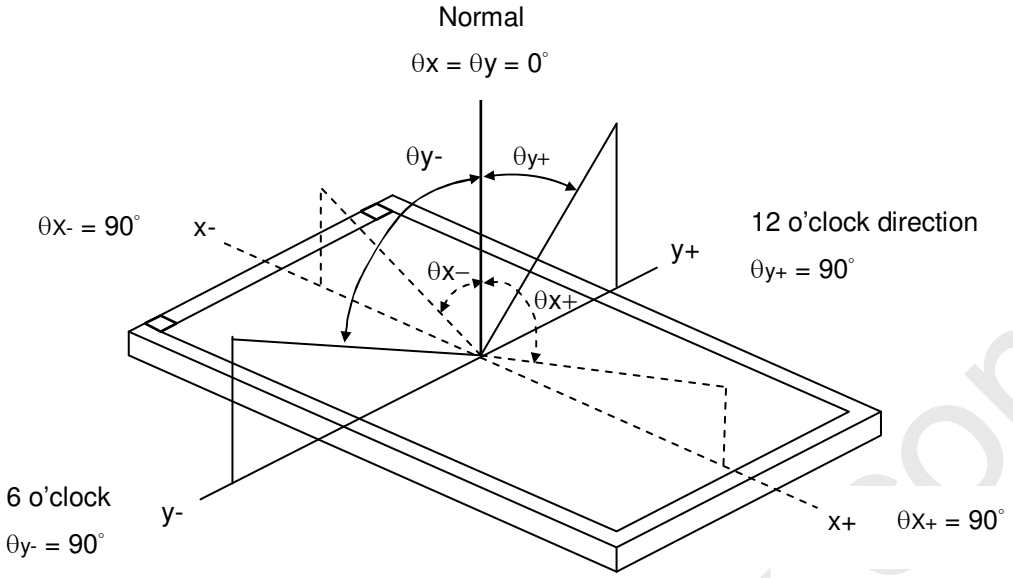
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	℃
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Light Bar Input Current Per Input Pin	I_{PIN}	20 ± 0.6	mA_{DC}
PWM Duty Ratio	D	100	%
LED Light Bar Test Converter	CMO 27-D041745 + Transfer board		

7.2 OPTICAL SPECIFICATIONS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing Angle at Normal Direction	700	1000	-	-	(2)
Response Time		T_R		-	1.3	2.2	ms	(3)
		T_F		-	3.7	5.8		
Center Luminance of White		L_C		250	300	-	-	(4)
White Variation		δW		-	-	1.3	-	(7)
Cross Talk		CT		-	-	4	%	(5)
Color Chromaticity	Red	Rx		Typ. -0.03	(0.638)	Typ. +0.03	-	(6)
		Ry			(0.337)		-	
	Green	Gx			(0.309)		-	
		Gy			(0.605)		-	
	Blue	Bx			(0.151)		-	
		By			(0.060)		-	
	White	Wx			0.285		-	
		Wy			0.293		-	
	Color Gamut	CG		(68)	-	-	%	NTSC Ratio
Viewing Angle	Horizontal	θ_{x+}+θ_{x-}	CR>10	150	170	-	Deg.	(1), (6)
	Vertical	θ_{Y+}+ θ_{Y-}		140	160	-		
	Horizontal	θ_{x+}+θ_{x-}	CR> 5	160	178	-	Deg.	(1), (6)
	Vertical	θ_{Y+}+ θ_{Y-}		150	170	-		

Note (1) Definition of Viewing Angle (θx, θy):

Viewing angles are measured by Autronic Conoscope Cono-80



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

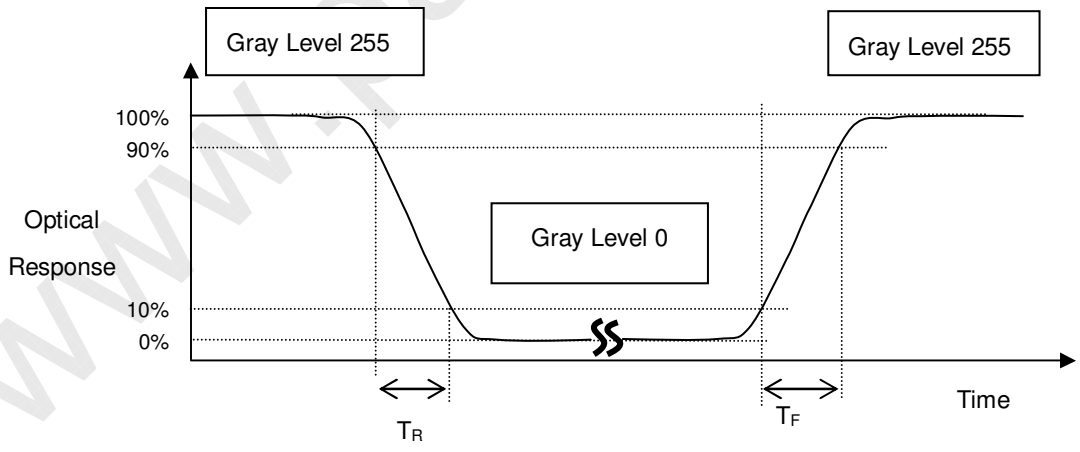
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5),

CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (7).

Note (3) Definition of Response Time (T_R, T_F):



Note (4) Definition of Luminance of White (L_C):

Measure the luminance of gray level 255 at center point and 5 points

L_C = L (5)

L (X) is corresponding to the luminance of the point X at the figure in Note (7).

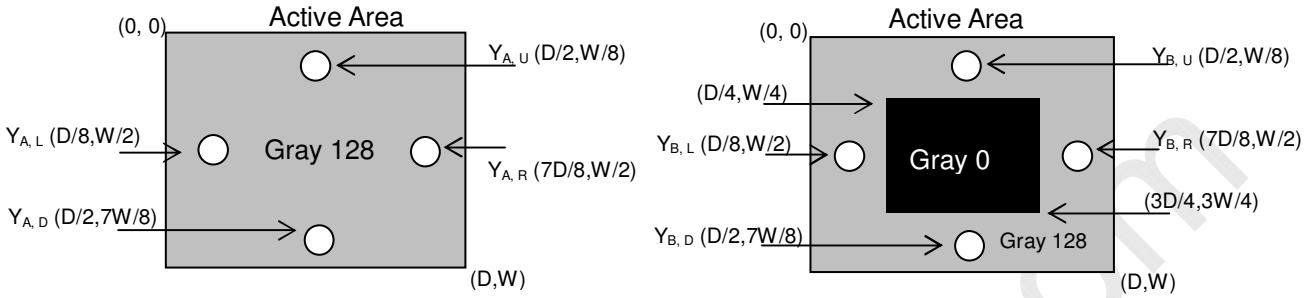
Note (5) Definition of Cross Talk (CT):

$CT = | Y_B - Y_A | / Y_A \times 100\ (\%)$

Where:

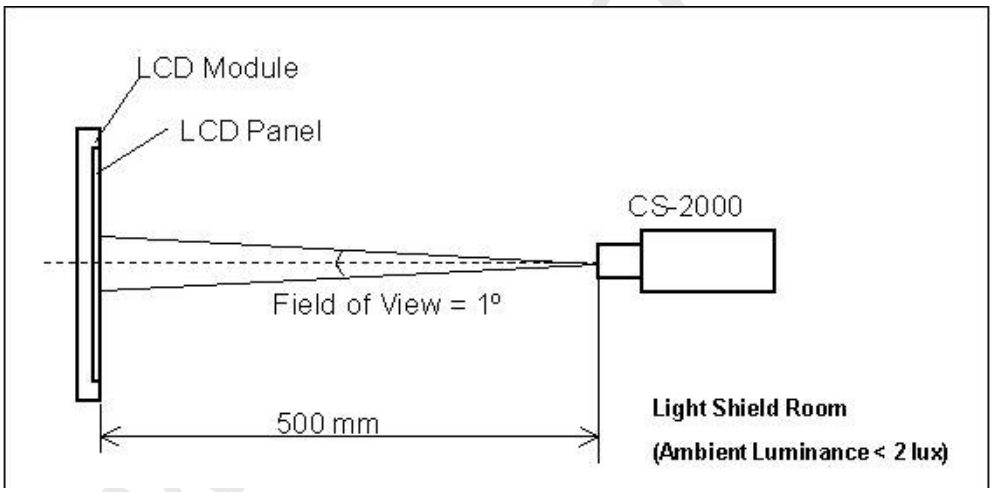
Y_A = Luminance of measured location without gray level 0 pattern (cd/m^2)

Y_B = Luminance of measured location with gray level 0 pattern (cd/m^2)



Note (6) Measurement Setup:

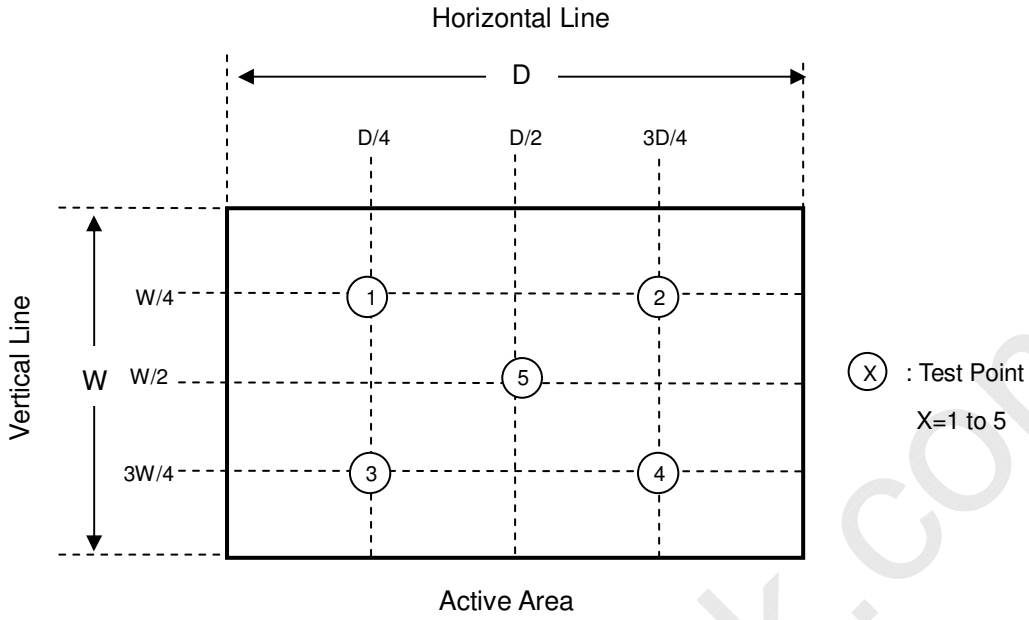
The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



Note (7) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

δW = Maximum [L (1), L (2), L (3), L (4), L (5)] / Minimum [L (1), L (2), L (3), L (4), L (5)]



8. PRECAUTIONS

8.1 ASSEMBLY AND HANDLING PRECAUTIONS

[1] Do not apply rough force such as bending or twisting to the module during assembly.

[2] It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

[3] Do not apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.

[4] Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.

[5] Do not plug in or pull out the I/F connector while the module is in operation.

[6] Do not disassemble the module.

[7] Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

[8] Moisture can easily penetrate into LCD module and may cause the damage during operation.

[9] When storing modules as spares for a long time, the following precaution is necessary.

[9.1] Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35℃ at normal humidity without condensation.

[9.2] The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

[10] When ambient temperature is lower than 10℃, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of CCFL will be higher than that of room temperature.

8.2 SAFETY PRECAUTIONS

[1] The startup voltage of a Backlight is approximately 1000 Volts. It may cause an electrical shock while assembling with the inverter. Do not disassemble the module or insert anything into the Backlight unit.

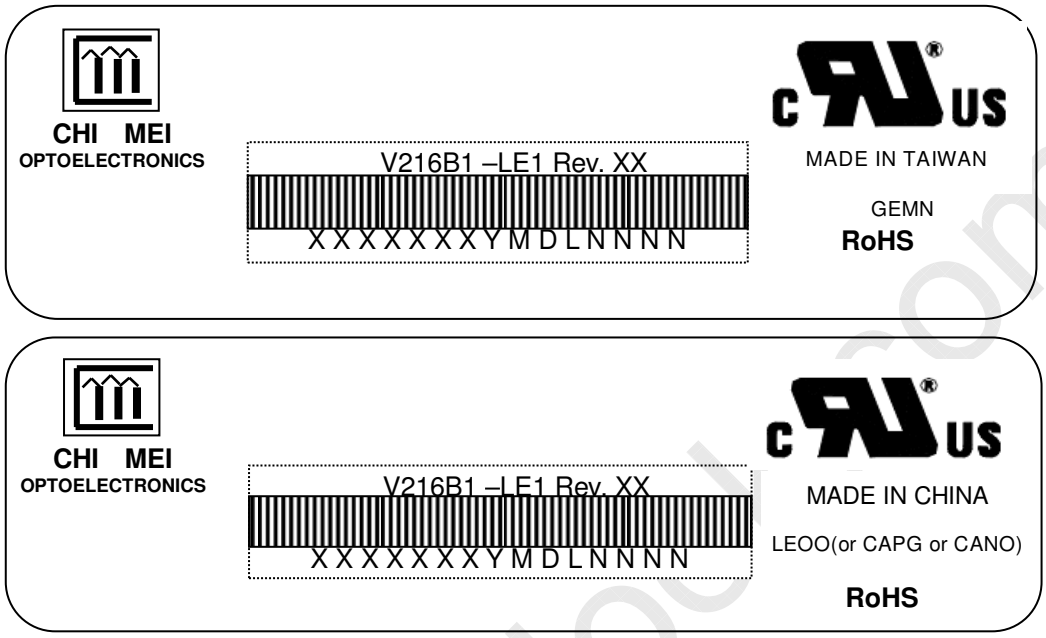
[2] If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

[3] After the module's end of life, it is not harmful in case of normal operation and storage.

9. DEFINITION OF LABELS

9.1 CMO MODULE LABEL

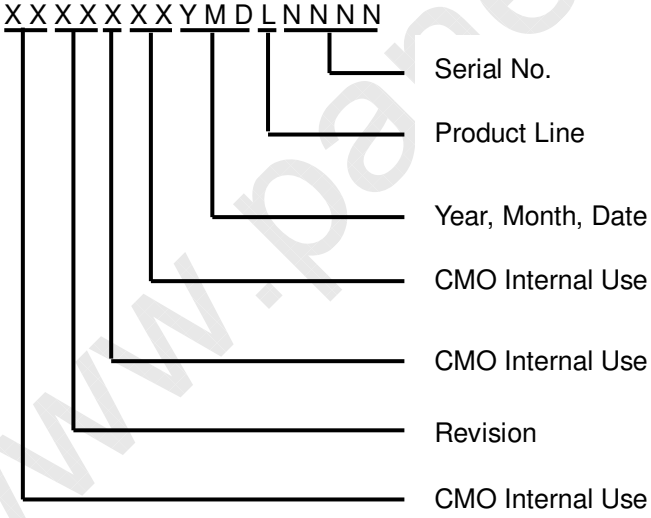
The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



Model Name: V216B1-LE1

Revision: Rev. XX, for example: A0, A1… B1, B2… or C1, C2…etc.

Serial ID: X X X X X X Y M D L N N N N



Serial ID includes the information as below:

Manufactured Date:

Year: 2001=1, 2002=2, 2003=3, 2004=4…2010=0, 2011=1, 2012=2...

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I, O, and U.

Revision Code: Cover all the change

Serial No.: Manufacturing sequence of product

Product Line: 1 -> Line1, 2 -> Line 2 …etc.

10. PACKAGING

10.1 PACKING SPECIFICATIONS

(1) 15 LCD TV modules / 1 Box

(2) Box dimensions: 563(L) X 417 (W) X 375 (H) mm

(3) Weight: approximately 33Kg (15 modules per box)

10.2 PACKING METHOD

Figures 10-1 and 10-2 are the packing method

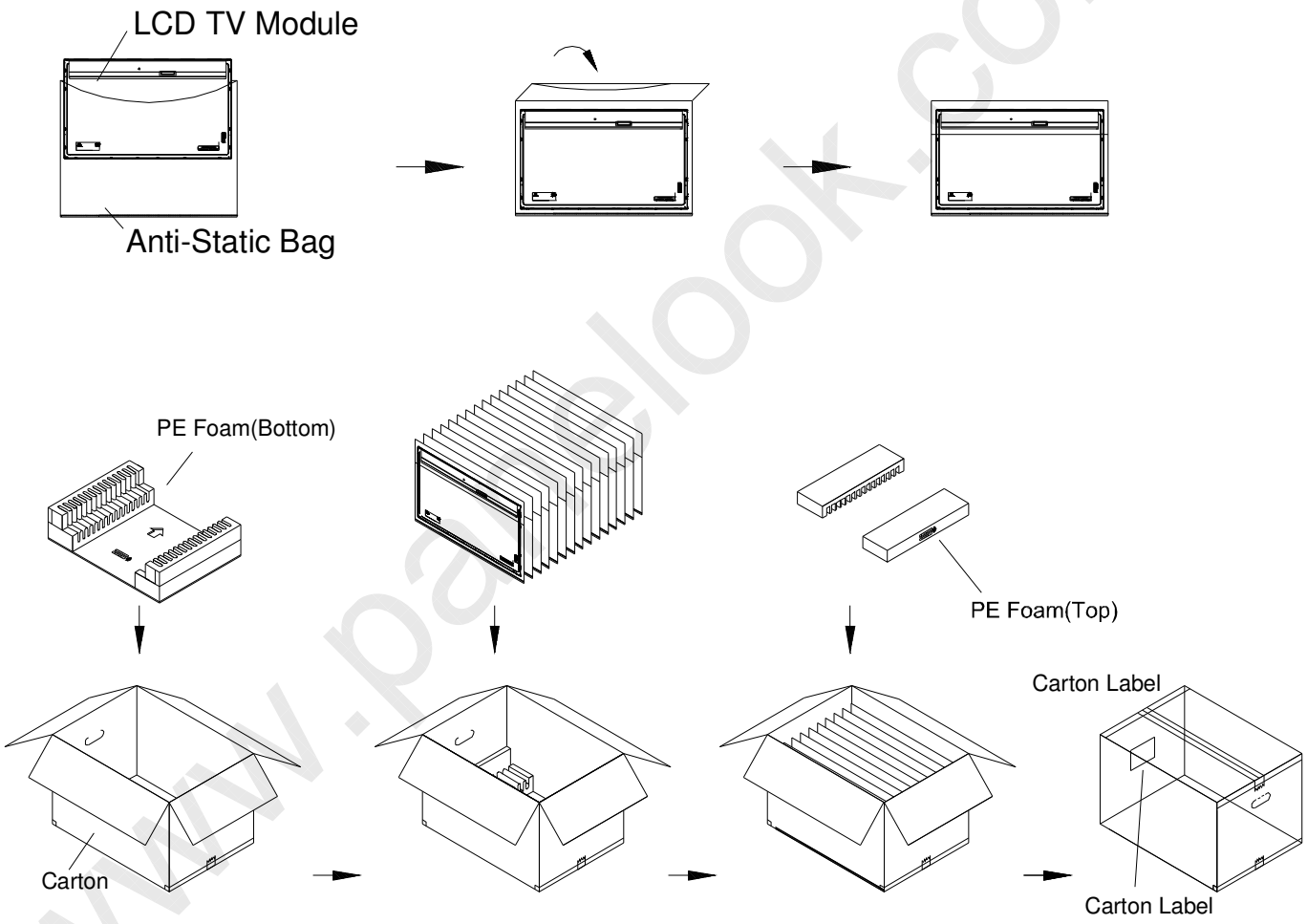
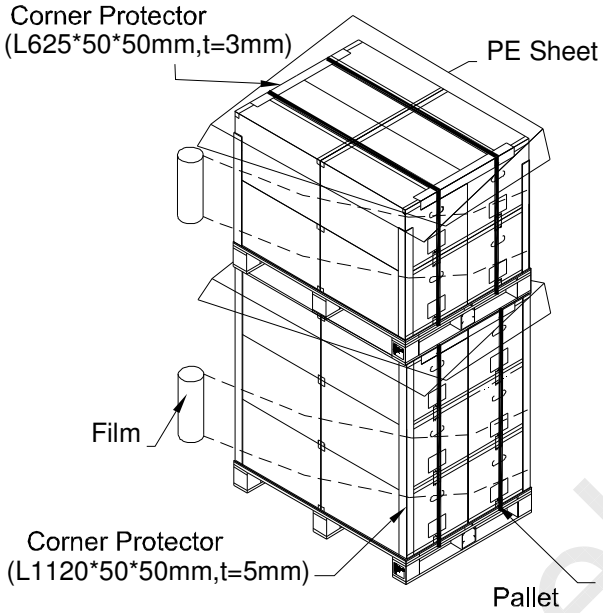
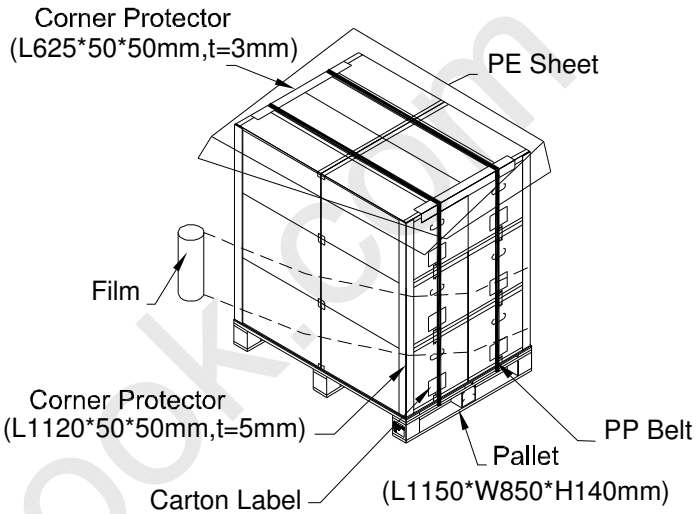


Figure.10-1 packing method

Sea / Land Transportation (40ft Container)



Air Transportation



Sea / Land Transportation (40ft HQ Container)

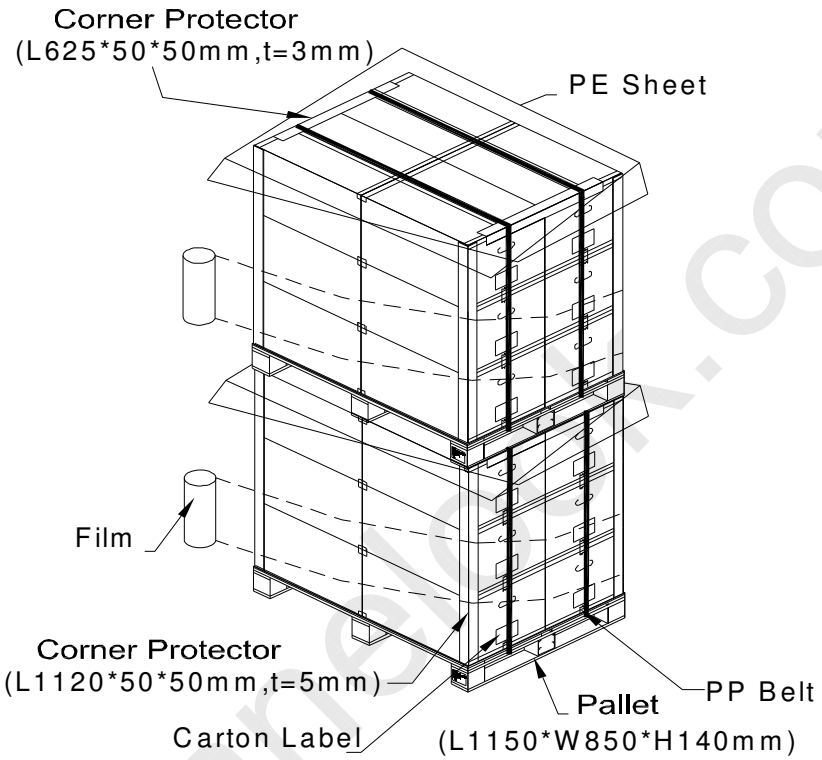


Figure.10-2 packing method

11. MECHANICAL CHARACTERISTICS